APPENDIX 6

DEPARTMENT OF TRANPORTATION
DIVISION OF CONSTRUCTION
Office of Transportation laboratory
P. 0. Box 19128
Sacramento, California 95819
(916) 444-48000

California Test 547
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OPERATION OF BRIDGE PROFILOGRAPH AND EVALUATION OF PROFILES

A. SCOPE

The operation of the Bridge Profilograph, the procedure for determining the "counts per 100 feet" from the profilograms, and the procedure for locating individual high points in excess of a 'specified limit are described in Parts I, II, and III respectively of this test method.

PART 1-OPERATION OF THE BRIDGE PROFILOGRAPH

A. EQUIPMENT

The Bridge Profilograph consists of a frame 12 feet long supported on one wheel at each end with an outrigger wheel for balancing support (see Figure 1). The profile is recorded from the vertical movement of a wheel attached at the midpoint of the frame and is in reference to the mean elevation of the end wheels in contact with the deck surface. The profilogram is recorded on a scale of one inch equal to 15 feet longitudinally, and one inch equal to one inch vertically. Motive power is supplied manually from the push handle in the rear. Steering is accomplished by rotating the handle grip to move the front wheel.

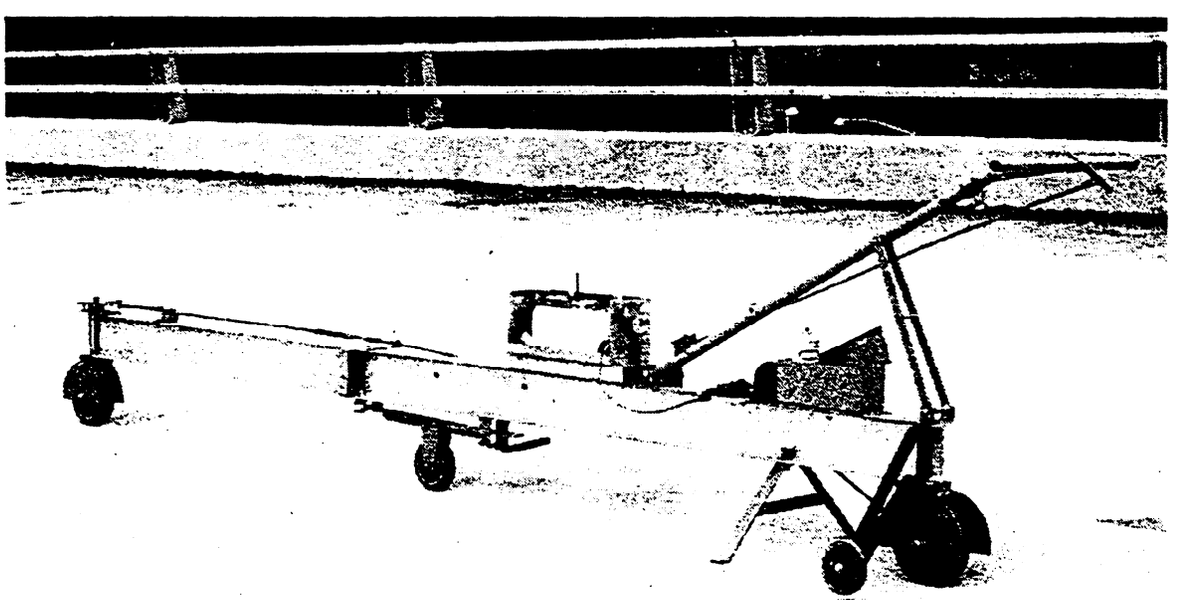

FIGURE 1. BRIDGE PROFILOGRAPH

B. OPERATION

The Bridge Profilograph is transported in two pieces which readily bolt together. The recorder is mounted by use of two spring clips on each end. A cable is connected from the profile wheel to the recorder for the vertical scale movement and a speedometer cable hookup to the rear wheel is used for the horizontal scale movement.

In operation, the profilograph should be moved at a speed no greater than a walk. Too high a speed will result in a profilogram that is difficult to evaluate. The deck surface should be swept clean of any loose

material along the paths to be profiled, and the wheels should be kept clean and free of particles which may become imbedded in the tires. Initial profiles should normally be obtained at approximately each planned wheel path of each traffic lane.

Calibration of the profilograph should be checked periodically. The horizontal scale can be checked by running a known distance and scaling the result on the profilogram. If the scale is in error of more than 22 percent, the rear wheel of the profilograph should be replaced with one of proper diameter. The vertical scale is checked by putting a board of known thickness under the profile wheel and again scaling the result on the profilogram. If the scale is in error, the cause of the incorrect height should be determined and corrected.

PART II-DETERMINATIONS OF COUNTS PER 100 FEET FROM PROFILOGRAMS

A. PROCEDURE

To determine the "counts per 100 feet", use a plastic scale 1.70 inches wide and 6.66 inches long to represent a bridge deck length of 100 feet at a scale of l"= 15'. Such a plastic scale may be obtained from the Transportation Laboratory, Sacramento. Near the center of the scale is an opaque blanking band OX-inch wide extending the entire length of 6.66 inches. On either side of this band are scribed lines 0.l-inch apart, parallel to the opaque band. These lines serve as a conventient scale to measure deviations of the profile line above or below the blanking band. These deviations are called "scallops".

B. METHOD OF COUNTING

Place the plastic scale over the profile in such a way as to "blank out" as much of the profile as possible. When this is done, any scallops that appear above and below the blanking band will be approximately balanced (see Figure 2).

Starting at the right end of the scale, measure and total the height of all the scallops appearing both above and below the blanking band, measuring each scallop to the nearest 0.05% inch (half a tenth). Write this total on the profile sheet near the left end of the scale together with a small mark to align the scale when moving to the next section. Short portions of the profile line may be visible outside the blanking band but unless they project 0.03inch or more and extend longitudinally for 0.1%inch or more on the profilogram, they are not included in the count. (See Figure 2 for illustration of these special conditions.)

When scallops occurring in the first 100 feet are totaled, slide the scale to the left, aligning the right end of the scale with the small mark previously made, and proceed with the counting in the same manner. The last section counted may or may not be an even **100** feet. If not, the last section should be scaled to determine its length and then that portion of 100 feet should be prorated to equivalent 100 feet. For example:

Section Length	Counts, Tenths of an Inch per 100 Ft.
100 feet	4.0
100 feet	3.0
100 feet	2.0
60 feet (2.0 counts in 60 ft. prorated to 100)	3.33

C. LIMITATIONS OF COUNT IN 100 FOOT SECTIONS

When the specifications limit the profile count in "any 100-foot section", the scale is moved along the profile and counts made at various locations to find those sections, if any, that do not conform to specifications. The limits are then noted on the profile and can be later located on the deck surface prior to grinding.

D. LIMITS OF COUNTS

Profiles of the first and last 6 feet of the section being tested cannot be obtained until the adjoining pavement or bridge section is in place. At such time that the concrete bridge approach pavement is to be evaluated, profiles should be obtained starting at least 60 feet prior to each structure or approach slab continuously to at least 25 feet onto the bridge deck.

PART III-DETERMINATION OF HIGH POINTS

A. EQUIPMENT

Use a plastic template having a line 1.33 inches long scribed on one face with a small hole or scribed mark at either end, and a slot a specified distance from and parallel to the scribed line (Figure 3). (The 1.33-inch line corresponds to a horizontal distance of 20 feet on the horizontal scale of the profilogram.) The plastic template may be obtained from the Transportation Laboratory, Sacramento.

B. LOCATING POINTS IN EXCESS OF THE SPECIFIED LIMIT

At each prominent peak or high point on the profile trace, place the template so that the small holes or scribe marks at each end of the scribed line intersect the profile trace to form a chord across the base of the peak or indicated bump. The line on the template need'not be horizontal. With a sharp pencil, draw a line using the narrow slot in the template as a guide. Any portion of the trace extending above

this line will indicate the approximate length and height of the deviation in excess of the specified limit.

There may be instances where the distance between easily recognizable low points is less than 20 feet. In such cases, a shorter chord length shall be used in making the scribed line on the template tangent to the trace at the low points. It is the. intent, however, of this requirement that the baseline for measuring the height of bumps will be as nearly 20 feet as possible, but in no case to exceed this value. When the distance between prominent low points is greater than 20 feet, make the ends of the scribed line intersect the profile trace when the template is in a nearly horizontal position. A few examples of the procedure are shown in Figure 3.

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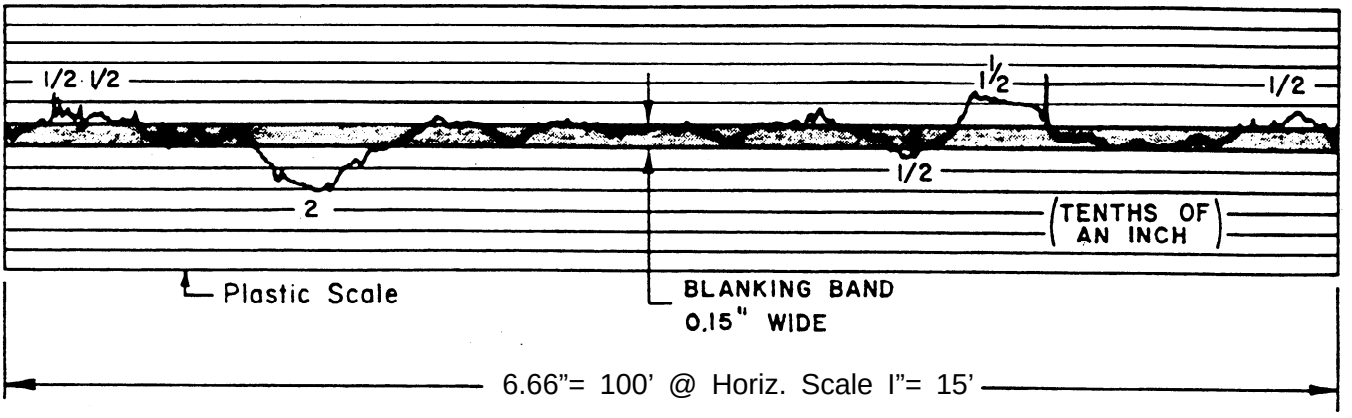
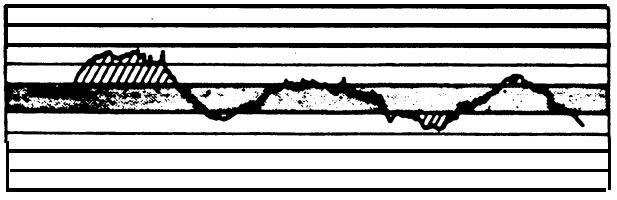
METHOD FOR OBTAINING PROFILE COUNTS



-Total count for 100' section is 5½

TYPICAL CONDITIONS

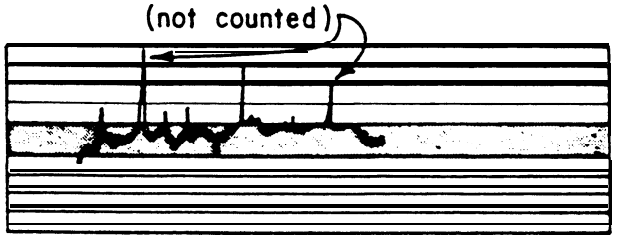
Scallops are areas enclosed by profile line and blanking band



Small projections which are not included in the count

SPECIAL CONDITIONS

Rock or dirt on deck (not counted)



Double peaked scallop (only highest part counted)

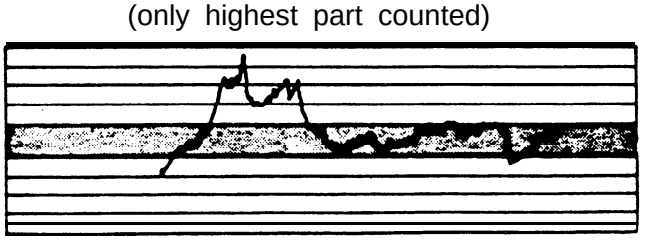
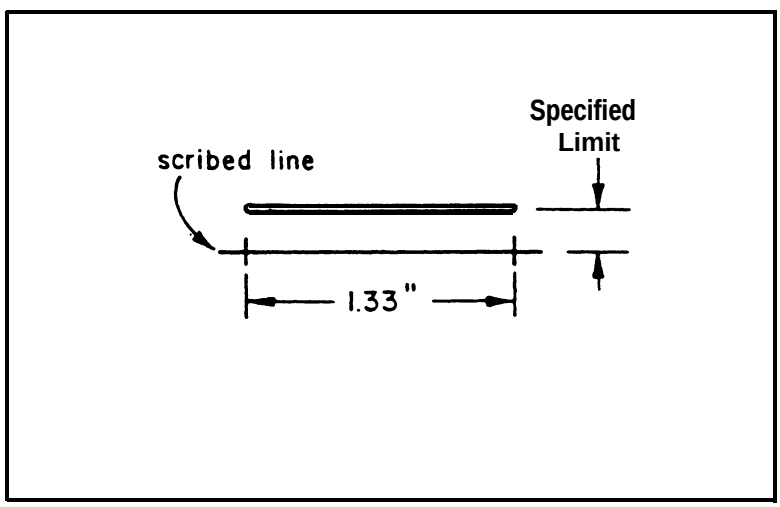
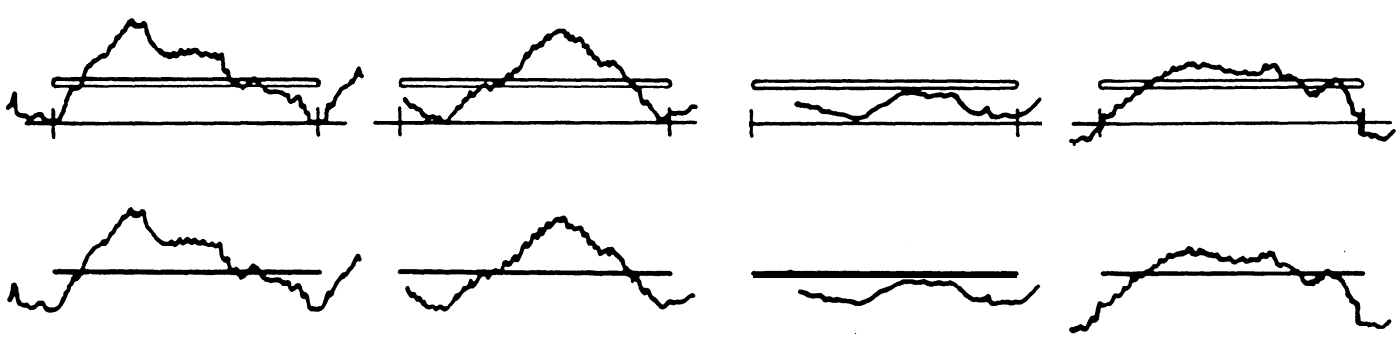


FIGURE 2

METHOD FOR PLACING TEMPLATE WHEN LOCATING BUMPS TO BE REDUCED



PLASTIC BUMP TEMPLATE



Baseline approx. 20 feet

Baseline less than 20 feet

Peak less than limit

Baseline more than 20 feet

FIGURE 3

Pressure Injection Crack Sealing

The following procedure is used to seal surface cracks not meeting the surface intensity crack specification:

1. Cracks are cleaned out with compressed air.
2. l/4" wide strips of masking tape are placed transversely across the cracks at approximately 6" O.C.
3. The top of the cracks are sealed with a two-component polyester compound to which limestone flour and Cab-o-sil (inert filler) are added for body. The seal is supposedly capable of resisting a pressure of 300 psi, although this high a pressure is seldom, if ever, necessary. (Chlorinated rubber curing compound does not seem to affect the bonding of the seal.)

   The strips of masking tape are removed before the seal hardens.

   Injection of two-component epoxy is made progressively along the crack through the openings made by the tape. (The epoxy components are dispensed and separately discharged to a mixing chamber immediately ahead of the nozzle. The nozzle is equipped with a rubber tip to form a seal. Nozzle pressure will vary from about 50 to 250 psi, depending on the size

of the crack and the degree of contamination). Injection is continued at each opening until the epoxy flows from the adjacent opening. The opening- at the point of injection is then sealed by rubbing cold paraffin over the surface.

6. After curing, the polyester seal is removed by a bump or traffic stripe grinder. (Sand-blasting (a) will not remove the seal material completely, (b) is time consuming and (c) damages the adjacent concrete.)

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SPECIFICATION and PRICES ***Order by Model number.**

Model*	Power	Field	Scale	Price
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1357	10x	265 inch	.005 inch	7.95
1357M	10x	6.8 mm	.1 mm	7.95
1357X	10x	.265 inch	Cross-hair	7.95
1357P	10x	.265 inch	Protractor	7.95
1352	20x	.190 inch	None	$5.95
1354	20x	.190 inch	.002 inch	7.95
1354M	20x	4.8 mm	.1 mm	7.95
1354X	20x	.190 inch	Cross-hair	7.95
1354P	20x	.190 inch	Protractor	7.95
1353	40x	.082 inch	None	$ 8.95
1355	40x	.082 inch	.001 inch	12.95
1355M	40x	2.1 mm	.1 mm	12.95
1355M2	40x	2.1 mm	.02 mm	12.95
1355X	40x	.082 inch	Cross-hair	12.95
1355P	40x	.082 inch	Protractor	12.95
1358	50x	.065 inch	None	$10.95
1359	50x	.065 inch	.001" & .1 mm	13.95

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